Fourth Homework Assignment for Math 408 and 708

Due: Wednesday, November 12th, 2008, in class.

Problems for Math 408 and 708:

1. Chapter 8 problem 8.

2. Show that the system $\{x, y \in \mathbb{R}^2 | x + y \le 0, x - y \le 0\}$ is not TDI, but that if we add the redundant inequality $x \le 0$, the system becomes TDI.

3. What is the dimension of the subtour relaxation polytope of the symmetric travelling salesperson polytope on the complete graph of size k?

4. Chapter 9 problem 1.

5. Chapter 9 problem 3.

Additional problems for Math 708:

6. Chapter 9 problem 4.

7. Consider the stable set formulation from Chapter 9, problem 14. Take the graph G which consists of a 5-cycle and a single vertex v_6 attached to each vertex of the cycle. (Such graphs are sometimes called *wheels*. Some years ago the 5-wheel also appeared as a crest on Chryslers). The 5-cycle inequality is valid for the 5-wheel.

   (1) What is the dimension of the face induced by the 5-cycle inequality? What is the dimension of the stable-set polytope of the 5-wheel?
   (2) Lift this face to a facet by adding a term representing the variable x_6 to the inequality.

8. What are the facets of the symmetric travelling salesman polytope for the complete graph on 5 vertices?

Reading:

Chapters 10 and 11.

Schedule of Presentations:

Wednesday, November 26th: John LaRusic. (O.R. Seminar, 3:30 pm, SUR 15-300).

Mihalis Yannakakis, *Expressing combinatorial optimization problems by linear programs*, J. Comput. System Sci. **43** (1991), no. 3, 441–466.

Friday, November 28th: Simon Lo.

Bernd Sturmfels, Robert Weismantel, and Günter M. Ziegler, *Gröbner bases of lattices, corner polyhedra, and integer programming*, Beiträge Algebra Geom. **36** (1995), no. 2, 281–298.

Monday, December 1st: Hua Zheng.

Samuel Burer and Jieqiu Chen, *A p-Cone Sequential Relaxation Procedure for 0-1 Integer Programs*, to appear.

Please verify if the schedule is correct and let me know ASAP if there are any errors.

Note there will be interesting Operations Research seminars on the 12th and 13th of November. The first is by Mehmet Begen of U.B.C., the second by Shane Henderson of Cornell.